ICPDR's Climate Change Adaptation Strategy and planned work on droughts

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Executive Secretary
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METEET Workshop on Climate Resilience
of Inland Waterways and Ports
6 June 2023
Online

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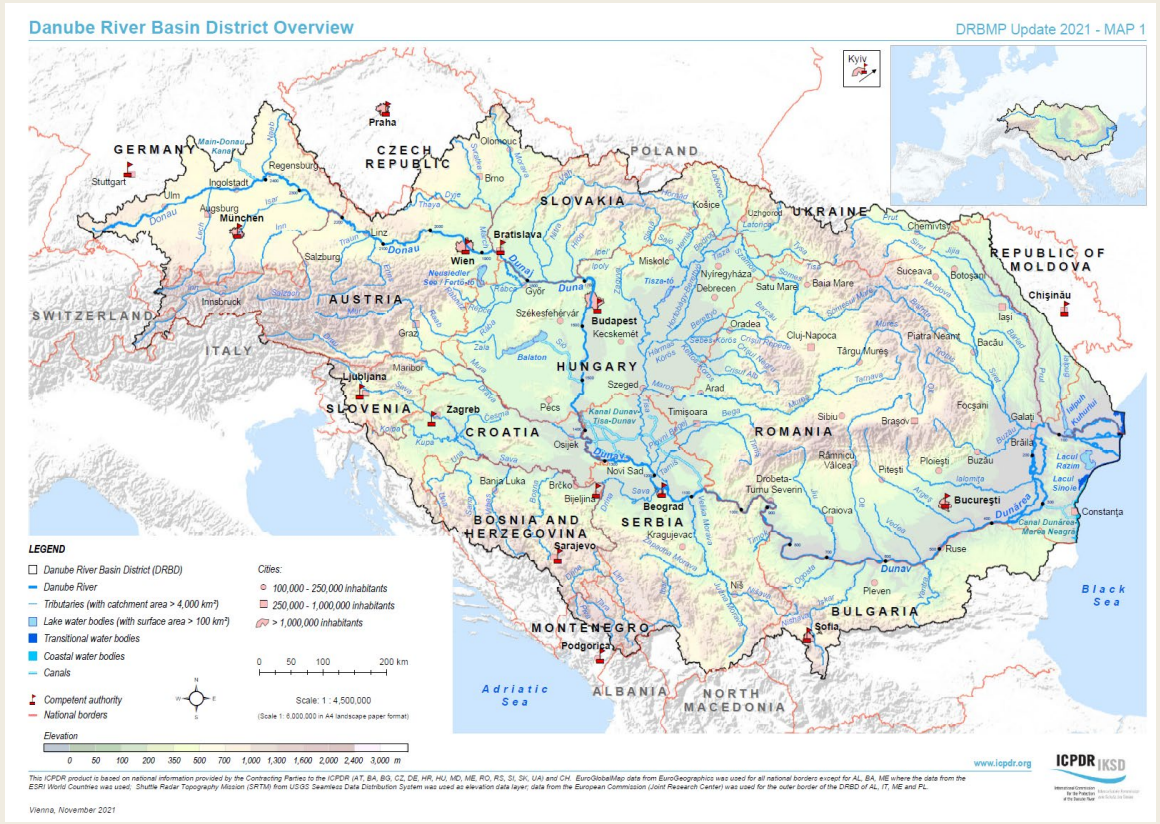
The Danube River Basin



- 800.000 km²
- 19 countries
- 79 million people
- High diversity - contracting parties to the ICPDR
  - 9 EU Member States
  - 5 Non-EU Member States

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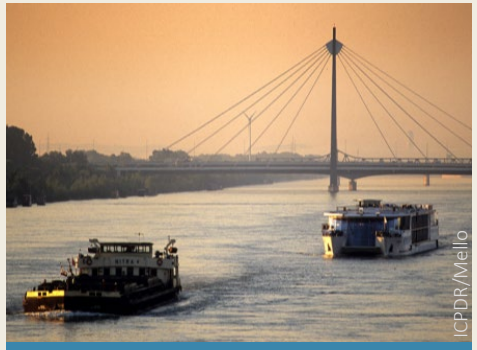
The ICPDR's Response to Danube Pressures

Aligned to the Danube River Protection Convention,
the EU Water Framework Directive and EU Floods Directive

Transnational Monitoring



Greener Navigation

Climate Change Strategy

Climate Change is being addressed jointly in the DRB

Joint Danube Survey

Accident Warning System

Sustainable Hydropower

Sustainable Agriculture

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Achievements since 1st Danube RBM Plan (2009)

61,745
hectares of wetlands & floodplains reconnected

127
fish migration aids constructed

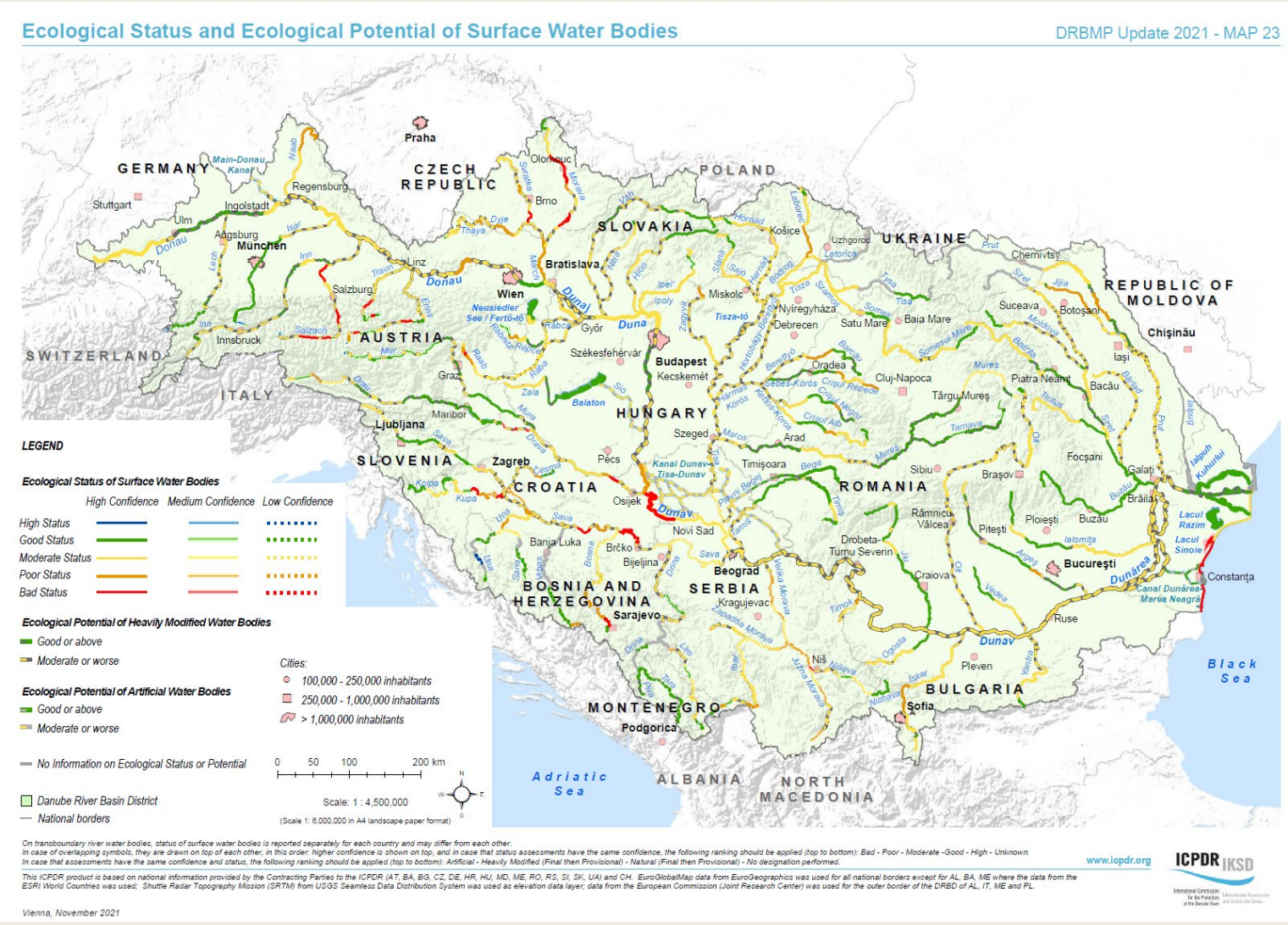
- 60%
organic emission

- 30% nitrogen emissions

58
river restoration projects completed

- 50%
phosphorous emissions

Climate Change in the DRB: What happens in the DRB?



Overview on water status across the whole basin as part of the Danube RBM Plan (EU WFD)

- The assessments currently **includes** possible negative impacts of CC
- **Understand CC effects per se in a better, more holistic way to ensure efficient adaptation**
- **Enable effective mitigation**

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Climate Change in the DRB: What happens in the DRB?

- Climate change effects are increasing in the DRB
  - Increased extreme events – droughts & floods
  - Extreme ice event in 2017
  - Drought and low water levels in 2022/2023
- **Action towards climate and water resilience are needed**

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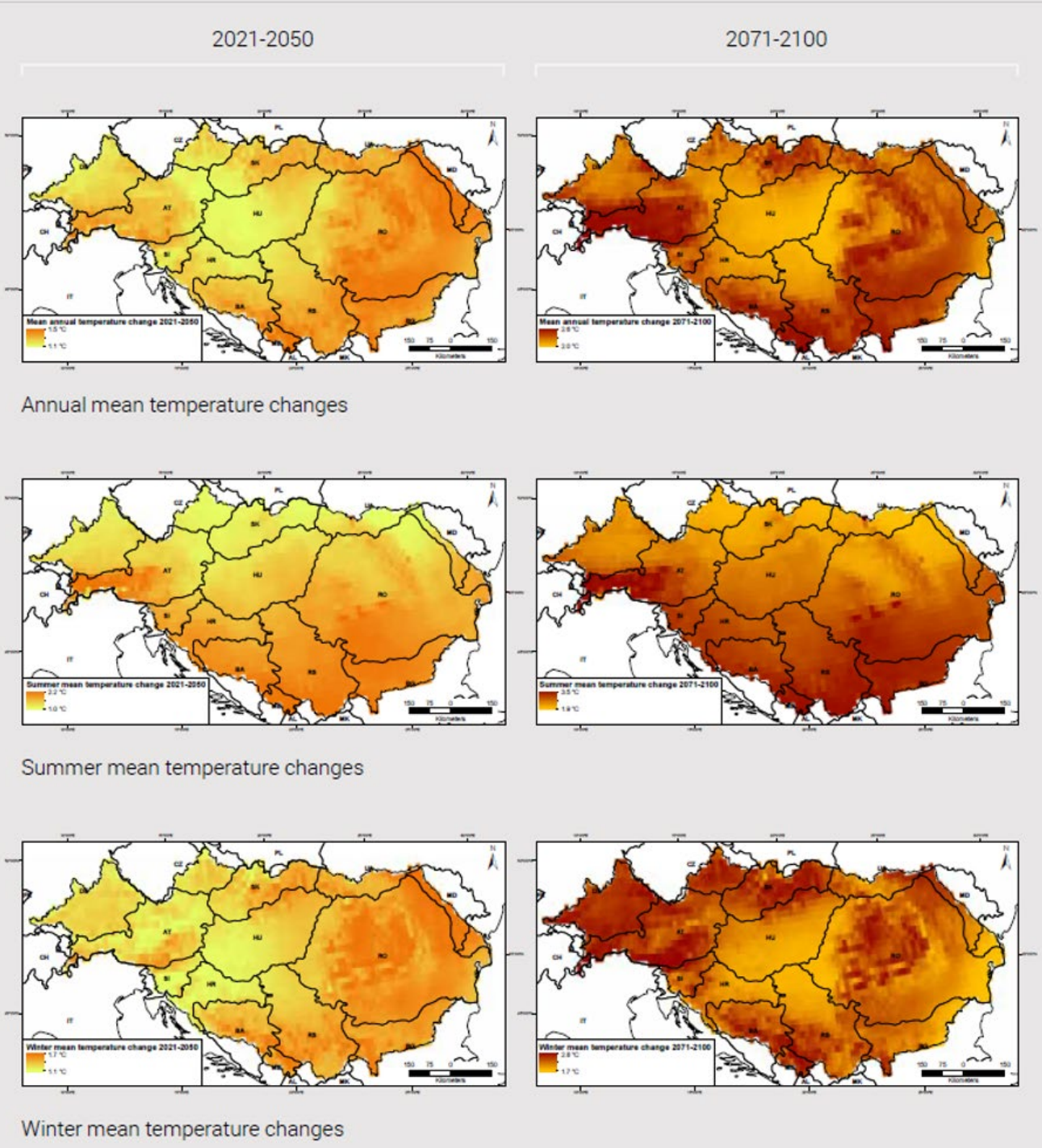
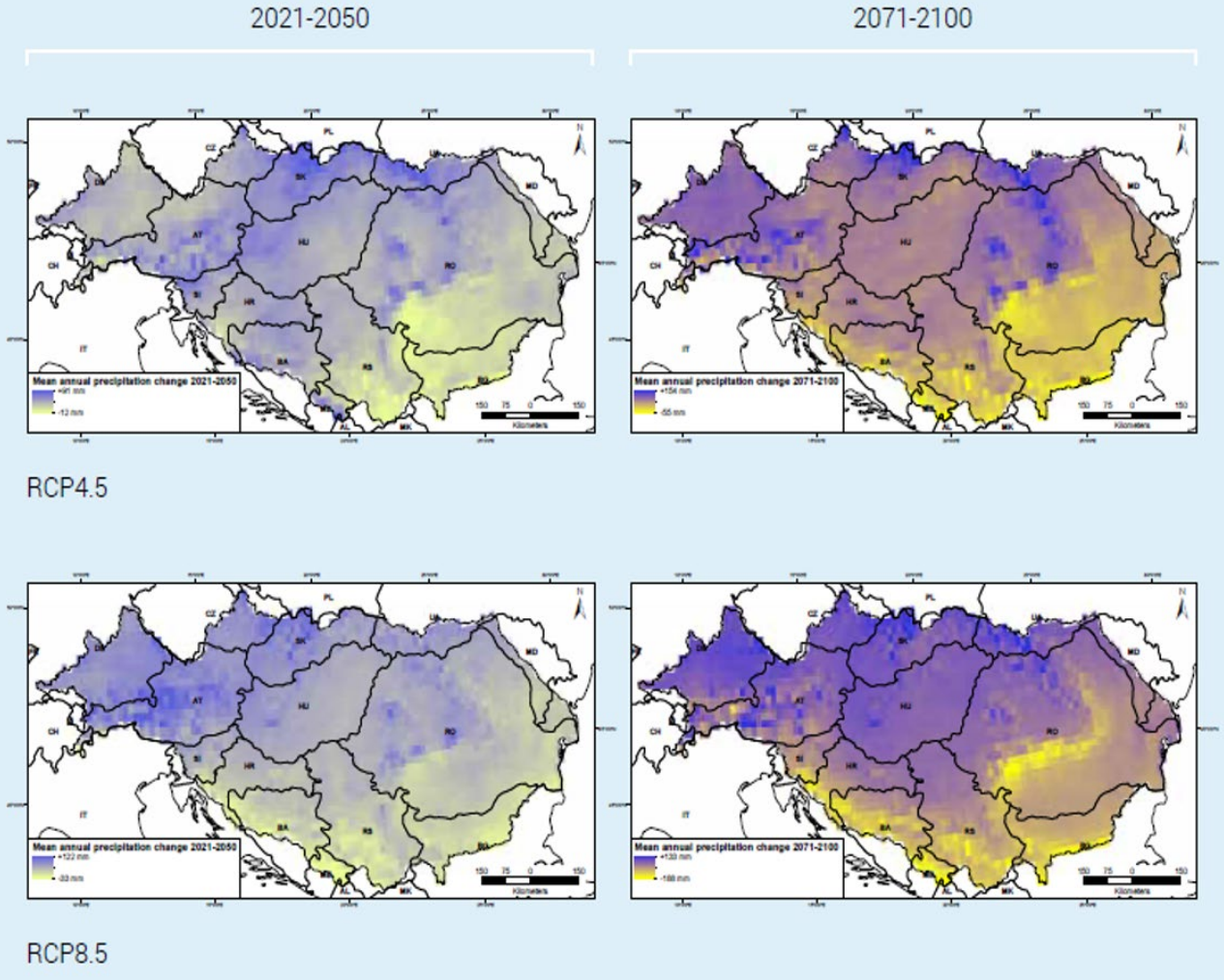
Climate Change Scenarios in the DRB

Changes **for annual, summer mean and winter mean temperatures** according to the Representative Concentration Pathways 4.5 of the EURO-CORDEX ensemble results *(Status 2018)*

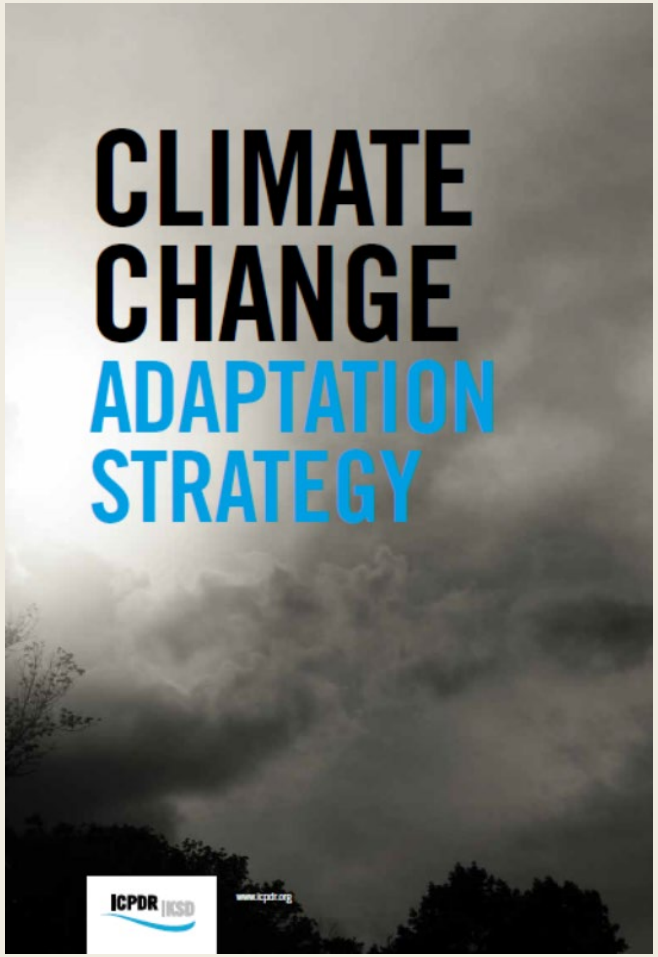


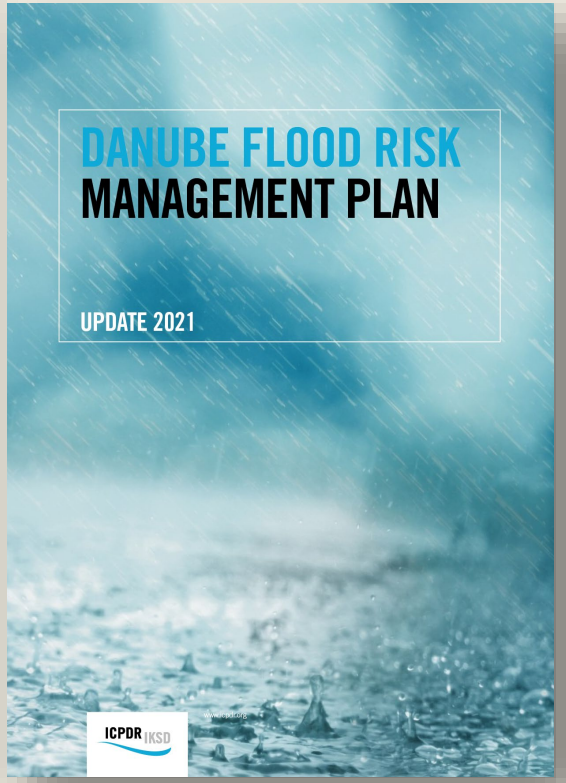
Climate Change Scenarios in the DRB

Changes of **mean annual precipitation** for periods 2021-2050 and 2071-2100 according to the Representative Concentration Pathways 4.5 and 8.5 of the EURO-CORDEX ensemble results *(Status 2018)*



Addressing Climate Change & Adaptation in the DRB





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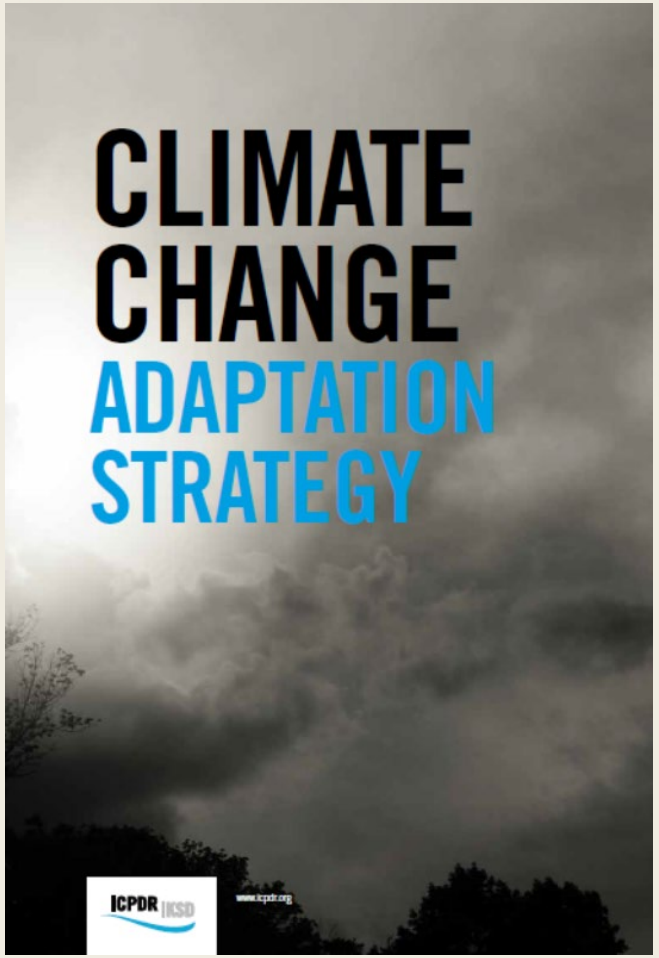
Several other supporting activities (e.g. Hydrological Information System; planned water balance; etc)

Addressing Climate Change & Adaptation in the DRB



Leading and pioneering RBO regarding CC adaptation

ICPDR CC Adaptation Strategy 2012 & update 2018:

- **Guides** how to integrate CC adaptation into overall ICPDR planning & management processes
- **Supports action** in transboundary context: **Tool-box of measures**
- **Influences and feeds into** national strategies and actions

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Projected Climate Change Impacts in DRB

Sector	UDRB Upper Danube River Basin	MDRB Middle Danube River Basin	LDRB Lower Danube River Basin	DRB Danube River Basin
Changes in the climate system				
Mean annual air temperature	↗	↗	↗	↗
Mean summer air temperature	↗	↗	↗	↗
Mean winter air temperature	↗	↗	↗	↗
Mean annual precipitation	→	↗		↗
Mean summer precipitation	↗	↘	↘	↘
Mean winter precipitation	↗	↗		↗
Heat extremes	↗	↗		↗
Extreme precipitation	↗	↗	↗	↗
Changes in discharge / water availability				
Mean annual discharge	↗	↗	↗	↗
Average summer discharge	↘	↘	↘	↘
Average winter discharge	↗	↗	↘	↗
Timing of the annual peak flow	↘	↘	↘	↘

Projected Climate Change Impacts in DRB

Sector	UDRB Upper Danube River Basin	MDRB Middle Danube River Basin	LDRB Lower Danube River Basin	DRB Danube River Basin
Changes in droughts and low/flows				
Drought	↗	↗	↗	↗
Low flow	↗	↗	↗	↗
Changes in floods				
Floods	↗	↗	↗	↗
Changes in agriculture				
Growing season	↗	↗	↘	↗↘
Damage from extreme events	↗	↗	↗	↗
Reliable production	→	↗↘		↗↘
Water demand	↗	↗	↗	↗
Invasive species/pests	↗	↗	↗	↗
New species/shift	↗	↗		↗
Changes in forestry				
Growing season	↗	↗↘		↗↘
Forest fires	↗	↗	↗	↗
Structure and stability	↘	↘		↘
New species/shift	↗	↗	↗	↗

Legend

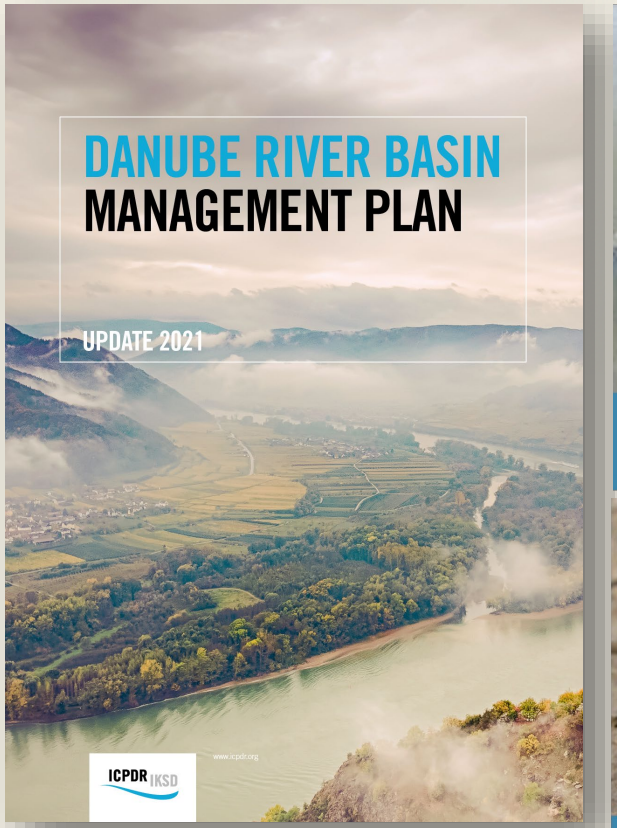
- *Beneficial change*
- *Adverse change*
- *Change neither beneficial nor adverse/small change*

↗	↘	↗	↘	↗	→	
Increase throughout most of a region	*Decrease throughout most of a region*	*Increase in substantial parts of a region*	*Decrease in substantial parts of a region*	*Increase as well as decrease in a region*	*Only small changes*	*No information (empty cell)*

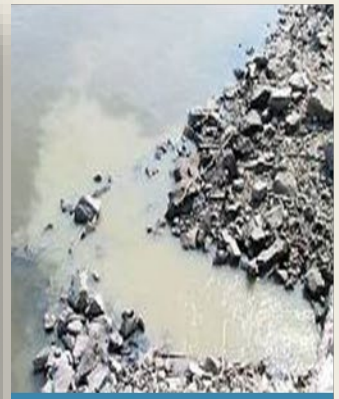
Projected Climate Change Impacts

Sector	UDRB Upper Danube River Basin	MDRB Middle Danube River Basin	LDRB Lower Danube River Basin	DRB Danube River Basin
Changes in biodiversity/ecosystems				
Number of native species	↘	↘	↘	↘
Number of invasive species	↗	↗	↗	↗
Water temperature	↗	↗	↗	↗
Shift of habitats	↗→	↗→	↗→	↗→
Vulnerability to changes in discharge	→	↗	↗	↗
Changes in water-related energy production				
Hydropower potential	→	↘↗	↘	↘↗
Thermal electricity potential	→	↘	↘	↘
Changes in navigation				
Ice cover	↘	↘	↘	↘
Low flow conditions	→	↗	↗	↗→

Climate Change & the Danube RBM Plan



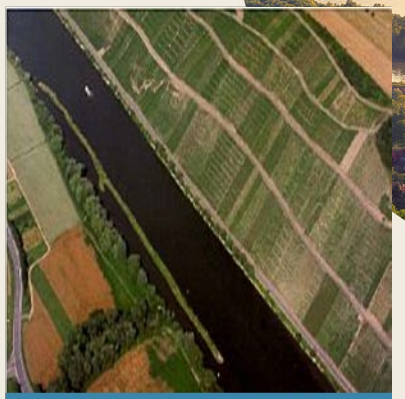
5 DRB Significant Water Management Issues



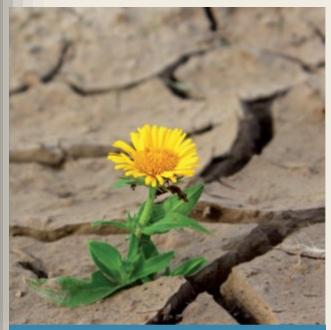
Organic Pollution

Nutrient Pollution

Hazardous Subst Pollution



Hydromorphological Alterations



Effects of Climate Change (drought, water scarcity, extreme hydrological phenomena and other impacts)

Climate Change Effects as SWMI

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Climate Change & the Danube RBM Plan

Effects of Climate Change (drought, water scarcity, extreme hydrological phenomena and other impacts)

SWMI Climate Change Effects to:

- **Respond** to increasing effects from CC
- **Assess** possible/additional negative impacts from CC
  - Surface waters and groundwater
- **React and identify** possible adaptation measures/actions
- **Consider/integrate** affected water uses in the DRB
  - This includes infrastructure and morphological measures
  - Stakeholder involvement

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Climate Change & Drought in the DRB

- Clear trend in increasing temperatures and less precipitation over last 30 years
  - In number and intensity
  - Across Europe including the DRB
- Drought events and low flows in rivers became increasingly frequent
- Economic losses are linked to drought events
- Severe droughts in the DRB since the beginning of 2022
- Further expansion of droughts / worsening early August 2022
  - Due to combination of lacking precipitation and heat waves as of May 2022
- Discharges across Europe were affected including the DRB
- Trends continued through winter 2022/2023

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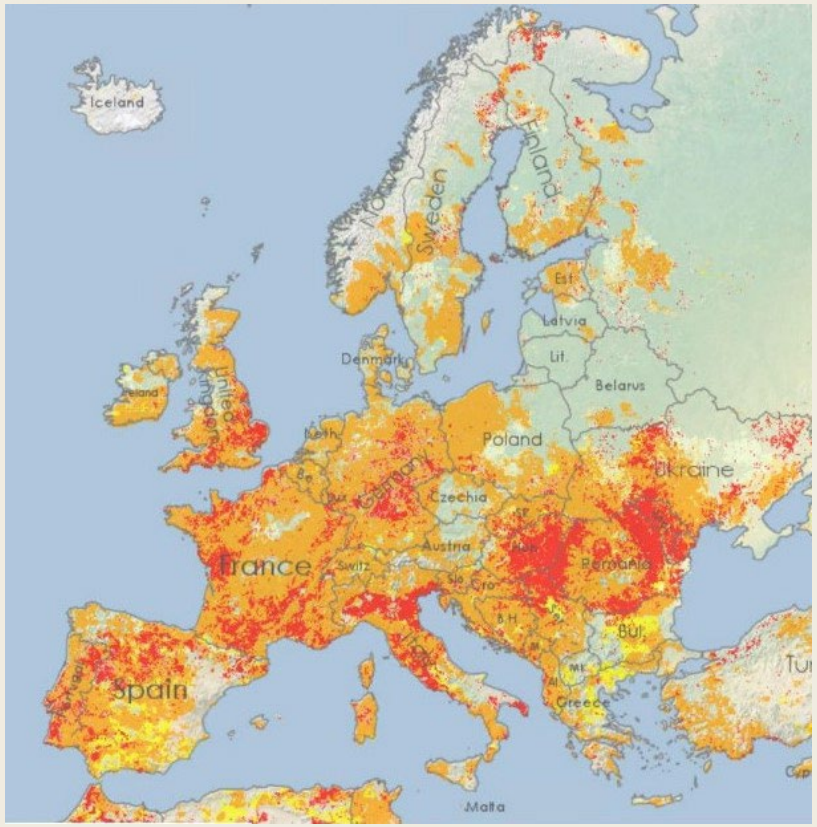
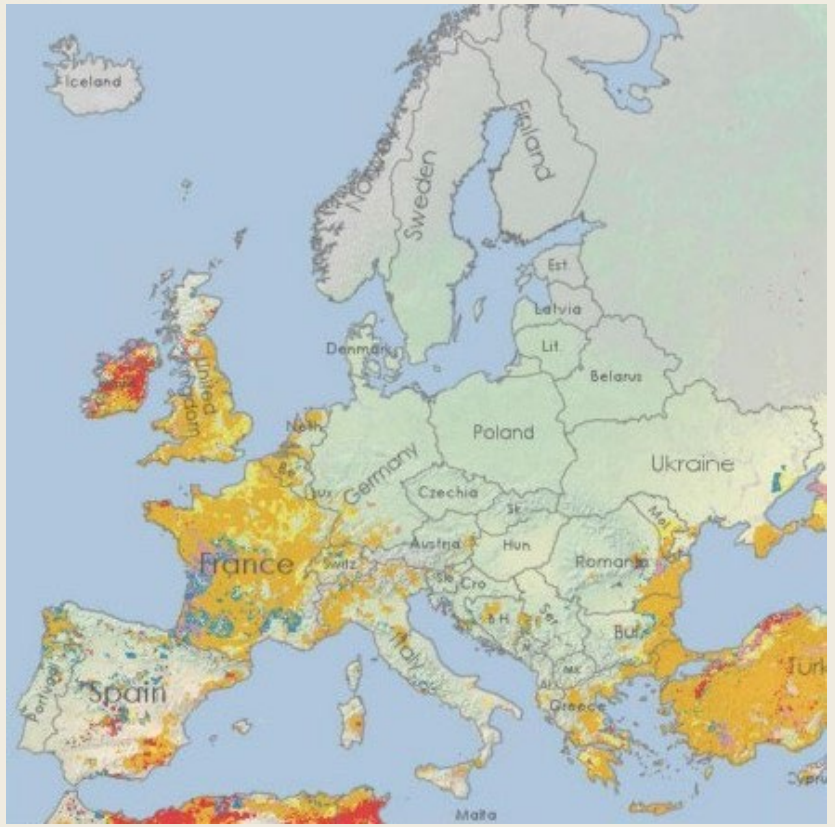
Climate Change & Drought in the DRB

Combined Drought Indicator (combination of precipitation, soil moisture and vegetation conditions) for August 2022 (left) and March 2023 (right).





JRC (2022 & 2023), Drought in Europe

Watch	Warning	Alert	Full recovery	Temporary soil moisture recovery	Temporary fAPAR recovery moisture recovery	No data

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Climate Change & Drought in the DRB

JRC (2022), Drought in Europe August 2022

Consequences of drought:

- Impacts on ecosystems / aquatic and terrestrial
- Impacts on water uses, e.g.
  - Reduced stored water volume with impacts on hydropower
  - Low water levels with impacts on navigation
  - Reduced summer crops' yield

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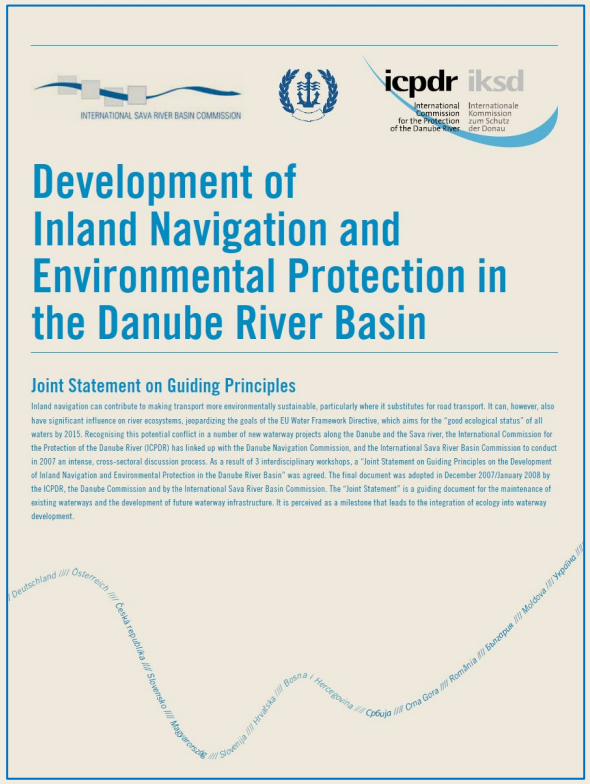
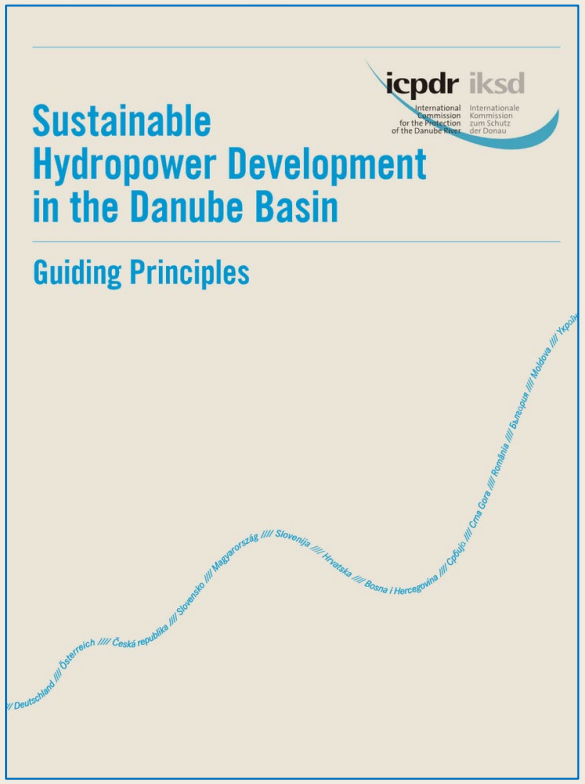
Climate Change & Water Users





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Drought & Water Users

- **Aim:** Ensure Climate and Water Resilience
- Possible impacts from climate change – environment and water uses:
  - Stakeholder involvement is essential
- Linkage between management and water users (navigation; agriculture; hydropower)
  - Joint approach towards consensus
  - Find joint solutions considering economic development AND environmental requirements
- **In case of inland navigation:**
  - Meet the aims of the Joint Statement on Navigation/Environment
  - Planned update of the Joint Statement also addressing the changing climate and river dynamics in the DRB with technical actions and solutions
  - Innovative and integrative approaches with the potential to adapt flexibly to quickly changing climate conditions

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ICPDR Activities on Drought

- Discussion at 25th Ordinary Meeting in December 2022 and 21st Standing Working Group (15 June 2023)
- **Drought and low water is considered as important** as important for further action by the ICPDR
- **Internal ICPDR Workshop on Drought and Low Water Level in the DRB**
  - 16 June 2023 in Belgrade/Serbia
  - Aim: understand and identify DRB **transboundary** needs regarding droughts/low water levels to put forward possible actions on the ICPDR level to tackle these needs
  - Next steps will be identified
- Likely **develop overview on approaches, activities and policies** regarding drought/low water in the ICPDR countries (considering activities within other RBOs and under the EU CIS)
- **2023/2024: Plan and Implement process to update the Joint Statement** also addressing climate change and drought accordingly

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Possible Next Steps

- **Increase knowledge** for well-informed Climate Change adaptation and ensure action
- **Identify a way forward** to better understand drought dynamics and implications in the DRB
- **Integrated assessment of CC** in future Danube RBM Plan and Flood Risk Management Plan
- **Further stakeholder and sector involvement** to ensure holistic Climate Change adaptation and effective measures

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Thank You For Your Attention!

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